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ABSTRACT

International Labor Market Competition and Spousal Labor Supply Responses*

We study how the 2004 EU enlargement to Eastern European countries has affected employment, earnings and the sharing of home production among workers employed in the Building and Construction industry, and their wives. We use license requirements to divide workers into two groups who are more and less exposed to labor market competition. We find that non-licensed workers experience a fall in labor earnings relative to licensed workers after the EU enlargement. Increased wife's labor supply and earnings compensate almost 40 percent of the loss. We do not find a similar change in the division of labor in home production.

JEL Classification: J21, J22, J61

Keywords: immigration, female employment, division of labor, parental leave

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1 Introduction

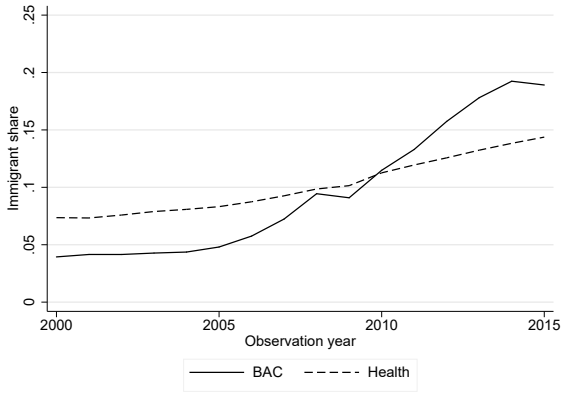
The integration of European labor markets in the EU has substantially increased the migration of workers across borders. Labor market immigration from low-cost EU-countries into high-cost countries such as Norway has been shown to narrow the labor market opportunities and decrease the relative earnings of native, male, vocational skilled workers (Bratsberg and Raaum, 2012; Finseraas et al., 2019; Kousmanen and Meriläinen, 2019). Wage declines due to increased competitions in the labor market are generally not insured by the social security system. This leaves a potentially important role of spousal labor supply as insurance against these earnings losses.

In this paper we analyse how households adapt to a specific shock; a rapid change in labour market competition, stemming from increased labour immigration. One of the largest changes in European labour markets in recent decades have come after the EU enlargement in 2004, when 10 Eastern European countries were included. The EU enlargement had large effects on the supply of manual workers with low reservation wages into countries such as Norway and led to a rapid increase in labour immigration from Eastern Europe, especially from Poland, Lithuania, and Latvia. A large share of the labour immigrants entered the Building and construction (BAC) industry, leading to a rapid increase in the labour supply stemming from immigration, especially after 2007, when the new countries implemented the Schengen-agreement and Norway implemented the EU Service Directive which eased the free movement of workers across borders. The share of immigrant workers in the BAC-industry increased from approximately 4 per cent in 2003 (the year preceding the EU-enlargement) to almost 20 per cent in 2015 (see Figure 1). And, while a large share of labour immigrants from the 'old EU countries' tend to return home after some years, approximately 70 per cent of immigrants from the new EU member states tend to settle permanently in Norway (Bratsberg and Røed, 2017)). The BAC-industry constitutes a non-trivial part of the Norwegian labour market. In 2003, the year preceding the EU-enlargement, approximately 20 per cent of all private sector employed men without university or college degree, worked in the BaC-industry.[1]

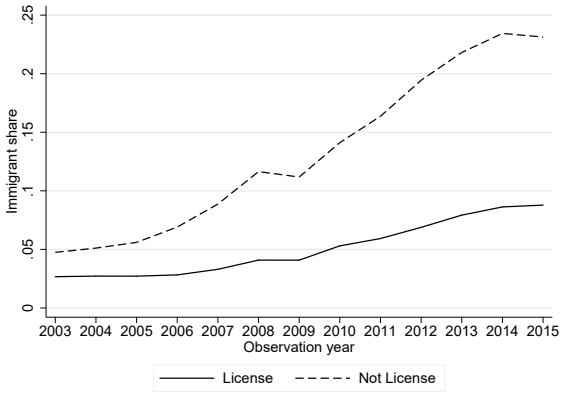
[1]Numbers based on own calculations on register data from Statistics Norway.

Figure 1: Share of immigrant workers, 2000-2015

(a) BaC and Health sector



(b) BaC: Licensed and Non-Licensed



Notes: Industry is defined by the industry standard classification system used in the European Union, NACE. There is a break in the time-series in 2008, when the classification was revised.

The BAC-industry is heavily male dominated, and therefore men were much more affected by the EU-enlargement than women. Typical female industries, like health and social services (which employs the largest share of wives in our sample, approximately 40 percent in 2003) did not experience the same increase in the share of immigrants (see Figure 1, panel (a)). Furthermore, a large share of women in these industries work part-time. For the household, therefore, adjusting female employment could potentially play a large role as insurance against earnings losses. We ask in this paper to what degree female labor supply and earnings respond to their husband's earnings loss in affected households. We further ask whether the relative change in the labor market position of the husband and wife also affects household division of labor between home production and market work more broadly through increased husband involvement in the rearing of children (measured by the taking up of paternity leave). We focus on men that were working in the BAC-industry in 2003, one year before the EU-enlargement.

To identify the empirical effect of increased labor market competition on household outcomes, we exploit the fact that some manual work in Norway is licensed (the worker needs certified vocational training), while some is not. For example, electricians need to be licensed for their work to be approved by the authorities, while painters need not.[2] Access to licensed

[2]The idea of using license demand in the Norwegian BAC-industry to estimate the effects of immigration was developed in Bratsberg and Raaum (2012). We build on their idea, but base the definition of licensed and

occupations are given to EU-citizens from other countries if they fulfill the license requirements. Often, however, the foreign workers and/or their employers must go through a lengthy bureaucratic process to prove that they do. Thus, the legal requirements give native Norwegians a competitive advantage with regard to employment in licensed occupations. The access to licensed and not licensed occupations is the basis for constructing groups that are exposed (treatment group) and not exposed (control group) to increased competition from immigration.

In Norway, the educational tracks to become licensed and not licensed tradesmen are similar, with two years of education in school and two years of practice to become an approved tradesman. We define a worker as Licenced or Non-licenced based on their type of education in 2003 and that the share of workers within the education group that works in a licensed occupation is low.[3] Our treatment and control groups are therefore similar workers in the same industry, but who are differently exposed to the immigrant shock. Empirically, we analyse the questions within a differences-in-difference framework, where licensed households are compared to non-licensed households before and after the expansion of the EU in 2004. Figure 1, panel (b), shows the development in the share of immigrants in the BAC-industry 2003-2015; in licensed and not-licensed occupations respectively. Year 2003 is the starting year since this is the first year with information on occupation. There is a striking difference between the two groups when it comes to the development in the share of immigrants. We see that the increase in immigrant share from 2003 is large in the occupations without license requirements, compared to the occupations with license protection.

Our study contributes generally to the broad literature analysing the consequences of labor immigration on local labor markets. In standard textbook models of labour markets, an increase in supply, for example due to immigration, will (at least in the short run) reduce the relative earnings of workers with comparable skills. Still, the empirical literature has not reached a consensus with respect to the size of the effects, and includes analyses reporting both negative and sizable effects (see e.g., Borjas (2003)), as well as studies reporting small and not-significant

non-licensed workers on a somewhat different approach.

[3]To identify occupational licensing we rely on the Norwegian Occupational Regulations Database, NORD. (Alecu and Drange (2016); Bol and Drange (2017)). We are grateful to Ida Drange for sharing their data set.

and even positive impacts (see e.g.,Ottaviano and Peri (2012). Part of the reason for the empirical controversy, is related to differences in methodological approaches that identify parameters that are not directly comparable (Dustmann et al. (2016). However, the empirical literature seems to agree that native workers that compete most directly with the immigrants, are also the ones who experience the strongest downward pressure on wages. Negative directs effects of immigration on wages have been empirically identified in the Norwegian labour market (see e.g. Bratsberg and Raaum (2012); Finseraas et al. (2019).

Secondly, our study contributes to the literature on household responses to income shocks and the added-worker-effect (AWE) (Ashenfelter, 1980; Heckman and Macurdy, 1980; Lundberg, 1985)). These models predict that the wife will respond by increasing her labor supply when the husband's labor market opportunities deteriorate. There are a number of papers testing the AWE effect by studying plant closures and mass layoffs (summarized in e.g. Halla et al. (2018)), that generally find small effects. Leading explanations for these small effects, are that temporary unemployment involve small effects on the household's life-time income and that these periods of unemployment are sufficiently insured through the social insurance system. There is also the possibility that shocks are correlated at the household level through e.g. similar sectors of employment or more generally through business cycle effects. In addition, there may be complementarity of leisure between the spouses and norms/preferences about gender roles in home and market production may serve as bars against labor supply responses of the wife.

The EU-enlargement that we study is a more permanent shock to the affected households' life-time earnings and has therefore potentially a larger effect on spousal labor supply than temporary unemployment. It clearly affected men much more than women, as males dominate the BaC-industry, and the majority has a wife employed in more sheltered public enterprises like health and education. Also, labor immigration from Eastern Europe contributed to facilitate high activity in a booming period in Norway, which also reduces the potential for correlated shocks. Both the size and the length of the shock, and the small probability of correlated shocks within the household, are two of the major advantages of our study. We investigate the role of

the social security system as insurance against these shocks by estimating the effect of the EU-enlargement also on the recipience of public transfers, and the role of substitutability in home production by estimating the effect on the uptake of parental leave for both partners. To investigate the role of social norms/preferences as constraints on labor supply responses, we do a heterogeneity analysis and split the sample according to labor market participation of the wife's and husband's mothers.

The empirical results show that skilled workers in exposed occupations, experience a fall in their employment probabilities and labor earnings after the EU-enlargement over the whole period 2004-2015. The negative effects stabilise at around 7.5 percent lower earnings and 3.3 percentage point lower employment probabilities. Only a small part of the wage loss is compensated by public transfers. We find large responses in wives' labour supply and earnings. Increased wife's earnings compensate almost 40 percent of the husband's earnings loss, largely driven by increased labor supply at the intensive margin. Wives' labor supply is therefore important as insurance in these kinds of shocks. We do not find that the change in the division of market work within the household affects the division of home production as measured by the sharing of parental leave.

The paper proceeds as follows: the next section presents theoretical predictions and related literature. Thereafter, we present the data and the empirical specifications. Then, the results section follow. The last section concludes.

2 Theoretical expectations and related literature

This paper builds on the classical model of household optimization in Becker (1973), where the household allocates work hours in market and home production according to comparative advantage at the respective tasks. The model predicts that when the employment probabilities and/or relative wages of the spouses change, spouses will readjust the division of labor in the family. When e.g the husband's wages fall, the household can compensate the earnings loss by increasing the wife's market work. An important precondition for the wife's labor supply to

increase, is that the leisure of husband and wife is substitutable through home production.

The theory was further developed in analyses of spousal labor supply as insurance against unemployment - the so-called "added worker effect" (AWE) (Ashenfelter, 1980; Heckman and Macurdy, 1980; Lundberg, 1985)). Stephens (2002) provides a life-cycle model of family labor supply and emphasises that the response of the wife to husband unemployment will consist both of an immediate response to the reduction in the household income, but also a response coming from lower expected wage offers in the future, affecting expected lifetime income. The labour supply response of the wife will depend on how anticipated the shock is, as well as the magnitude of the income loss of the household.

In addition to the purely economic incentives for household earnings optimisation, the labor market response of the wife may also be influenced by norms and preferences. The substitutability of home-production between the spouses may e.g. be constrained by preferences and notions about male and female abilities in these tasks. In addition, there might exist ideals as to who should be the breadwinner in the family. Bertrand et al. (2015) use U.S data and show how households cluster around earnings shares of exactly 50 percent and interpret this as preferences against earnings shares where the wife earns more that 50 percent. There is also a large literature that has shown how norms about female labor supply is transmitted through generations, indicating that a traditional division of labor takes time to change, see e.g., Fernández et al. (2004); Fernández and Fogli (2009).

The AWE-literature often report small effects of husband unemployment on female labor supply, measured by plant closings or mass layoffs (Stephens, 2002; Eliason, 2011; Hardoy and Schøne, 2014; Halla et al., 2018; Bredtmann et al., 2018).[4] The literature has however pointed to several explanations for why the effects are small: unemployment shocks are too small and temporary for life-time earnings to be seriously harmed, shocks may be correlated at the household level, leisure may be complementary between the spouses, and social insurance

[4]Mass layoffs and plant closures have however been shown to influence the household more broadly. It increases the probability of divorce (Rege et al., 2007; Eliason, 2012), deteriorates the health of both the husband and wife (Eliason and Storrie, 2009; Sullivan and von Wachter, 2009; Browning and Heinesen, 2012; Marcus, 2013), lowers the birth weight of new children (Lindo, 2011) school performance and labor market outcomes of children (Oreopoulos et al., 2008; Coelli, 2011; Rege et al., 2011)

may "crowd out" effects on wives' labor supply.

Changes in husbands' social insurance benefits seem to induce larger responses among wives. Fadlon and Nielsen (2015); David et al. (2017) find large labor supply responses among wives's whose husbands get fatally ill or are denied disability insurance, respectively. These larger responses are consistent with social insurance being sufficient insurance for temporary shocks like unemployment, but not for larger shocks to life-time earnings. Bredtmann et al. (2018) find that the AWE-effect varies greatly between different welfare regimes, also indicating that the availability of other insurance plays a role for the size of the labor market response of the wife. Declining wages due to labor market competition is typically not covered by the social security system. We might therefore expect a larger labor supply response of the wife following the EU-enlargement.

Halla et al. (2018) find, consistent with constraints to the substitutability of home production, that the labor market response is lower in couples with children below 2 years of age. To our best knowledge, there is however no direct measure of the substitutability of home-production in the AWE-literature.

Related to our study, are also some recent papers that have studied effects of declining job opportunities of male manual workers on household formation (Autor et al., 2018; Kearney and Wilson, 2018). Autor et al. (2018) study the effect of international manufacturing competition on household formation. They find that the relative deterioration of young men's job opportunities and wages lowers their marriage probabilities and fertility. These shocks also raises male premature mortality and increase the number of unwed mothers. Kearney and Wilson (2018) study an opposite labor market shock: local fracking booms in the US in recent decades. They find that the increased labor market opportunities of young men in affected areas increased the number of births, but did not have an effect on the marriage probabilities. They interpret their findings as signs that even though the fracking booms increased earnings for these men, they are not large enough to reverse the negative trend in marriageability of these men.

The literature so far points to potentially large changes to household dynamics in western societies following globalization. International competition often reduces men's job opportuni-

ties and wages more than women's, and the literature has so far showed that this has had large effects on young men's opportunities to form a family (Autor et al., 2018; Kearney and Wilson, 2018). The evidence from the AWE literature and the literature on spousal labor supply as insurance against larger shocks to life-time earnings points to a role of women's labor supply as insurance against (some of) the losses. We contribute with evidence that women's labor supply is more important when the shock is more permanent – with long term consequences for the household division of labor.

3 Data and empirical approach

We use high-quality individual register data with a panel dimension, enabling us to follow individuals over time, between different statuses in and outside the labour market. The data is collected and organised by Statistics Norway.

The starting point is a sample that consists of all married or cohabiting men (aged 25-55 years) who are vocationally skilled workers at upper secondary school level, and employed in the Building and construction industry in 2003, i.e., the year prior to the EU-expansion. We follow these workers and their partner's year-by-year until 2015.

We divide the sample into treatment and control groups based on occupational license requirements in the husband's education group, measured in 2003. It is vital for the identification strategy to identify otherwise comparable group of workers, that differ with respect to their exposure to immigration. In order to distinguish between exposed and not exposed workers we exploit information about individual workers' education and occupational affiliation in the register data, combined with information on whether the occupation is licensed or not. Concretely, we argue that native workers are sheltered from immigrant competition if they, through their type of vocational education, have access to licensed occupations in the labour market. In more detail; we classify individual workers as protected or not protected by licensing according to whether more than 10% of workers with the same education worked in a licensed occupation. We have also tried different cutoffs between 10% and 50% and the results are largely the same.

The full details on how we construct the treatment and control groups is described in Appendix, in Section A.1.

The household is defined as the household was in 2003. When we estimate the effect of the EU-enlargement on labor market outcomes etc of the spouse, it is therefore the spouse from 2003, regardless of whether the relationship is later dissolved. This is because marital dissolution may be a direct effect of poorer labor market opportunities, and conditioning on the couple staying together is therefore an endogenous conditioning of the sample.

We estimate a differences-in-difference model of the following form:

$$y_{it} = \gamma_t + \delta E_i + \sum_{t=2000}^{2015} \beta_t E_i T_t + \varepsilon_{it} \tag{1}$$

where y_{it} are the outcome-variables measured in year t (2000-2015) for individual i (the husband or wife). E_i is a dummy for whether the husband is exposed to competition from labour immigration(i.e., work in a non-licensed occupation) or not. γ_t is a vector of year indicators from 2000-2015, leaving out 2003 as the reference year. The model therefore both includes pre-treatment outcomes (2000-2002) and post-treatment outcomes both in the short and the medium run (2004-2015).

β_t is the vector of estimated differences between Non-licensed and Licensed workers. The estimates in the pre-period serves as tests of different pre-trends. The estimates for the post-period shows the effects of the EU-expansion on Non-licensed workers and their wives relative to Licensed workers and their wives and how they evolve over time, year by year. The key assumption for this "starting-line" approach to identify causal relationships is that the two groups would have had similar post-2003 trajectories if the immigrant shock had not happened. This assumption is impossible to test, but similar pre-trends are reassuring. The set-up in Equation 1, with a pre-period, enables us to test the pre-2003 trend in outcomes between treated and non-treated workers; to see whether the performance of the two groups of workers differed before the EU-expansion. In Table 1 and in Figure 2, we find no significantly different pre-trends, which support our identification stategy.

The main labor market outcomes are annual labor earnings and employment. Information about labor earnings is taken from the tax registry and is of high quality. To adjust earnings for general price- and wage growth, we use the Norwegian welfare authorities measures of "Base amounts" (BA) in the social security system. The BA is adjusted each year to make sure that recipients of welfare benefits have the same purchasing power as wage earners. In 2015 the amount was equal to 90,068 Norwegian kroner (NOK), or approximately 9,500 Euro. We adjust annual earnings by dividing the earnings by each year's BA, and then multiply with the 2015 BA to get everything in 2015 prices. Individuals with no annual labour earnings are included with zero earnings. We define employment at the extensive margin as earning more than 1 BA.[5]

Information on working time is rather coarse in the register data (there are only three working-time categories for the full period of observation). As a measure of employment responses at the intensive margin, we therefore exploit the information that lies in the tax registry on labor earnings. We construct dummy variables indicating earnings above several earnings thresholds. The thresholds are based on the BA's from the social security system. Most of the movement in the price and wage growth adjusted earnings from one year to the next, comes from movements in labor supply, and changes in the probability of earning above different earnings thresholds therefore indicate where movements in labor supply at the intensive margin happen.

The home production variables are number of children and the probability of staying married/cohabitant in addition to days of parental leave. Parental leave is only measured for those who become parents and is conditional on work the year before the child is born. The results for this measure should therefore be interpreted with caution and in relation to the effects on fertility and employment. In addition, there have been several changes to the parental leave period over the years that we study. To avoid comparing parents who are subject to different rules, we assign all the parental leave days associated with a child to the year the child is born, even

[5]There are several definitions of employment in the social security system. To be eligible for sickness absence benefits, earnings have to be above 1/2 BA. To be eligible for unemployment benefits, earnings have to be above 3/2 BA. We use 1 BA as a measure in the middle.

though the period stretches over more years. It is the year the child is born which determines the length of the total parental leave period and the mandatory fathers quota, and thus the relevant comparison is within parents who got children in the same year. Full parental leave periods are not registered for children born in the last observational year, and we therefore take 2015 out from this analysis. In addition, we have to condition on having worked the year before to be eligible for parental leave and have no estimate for the first year of observation, 2000, either.

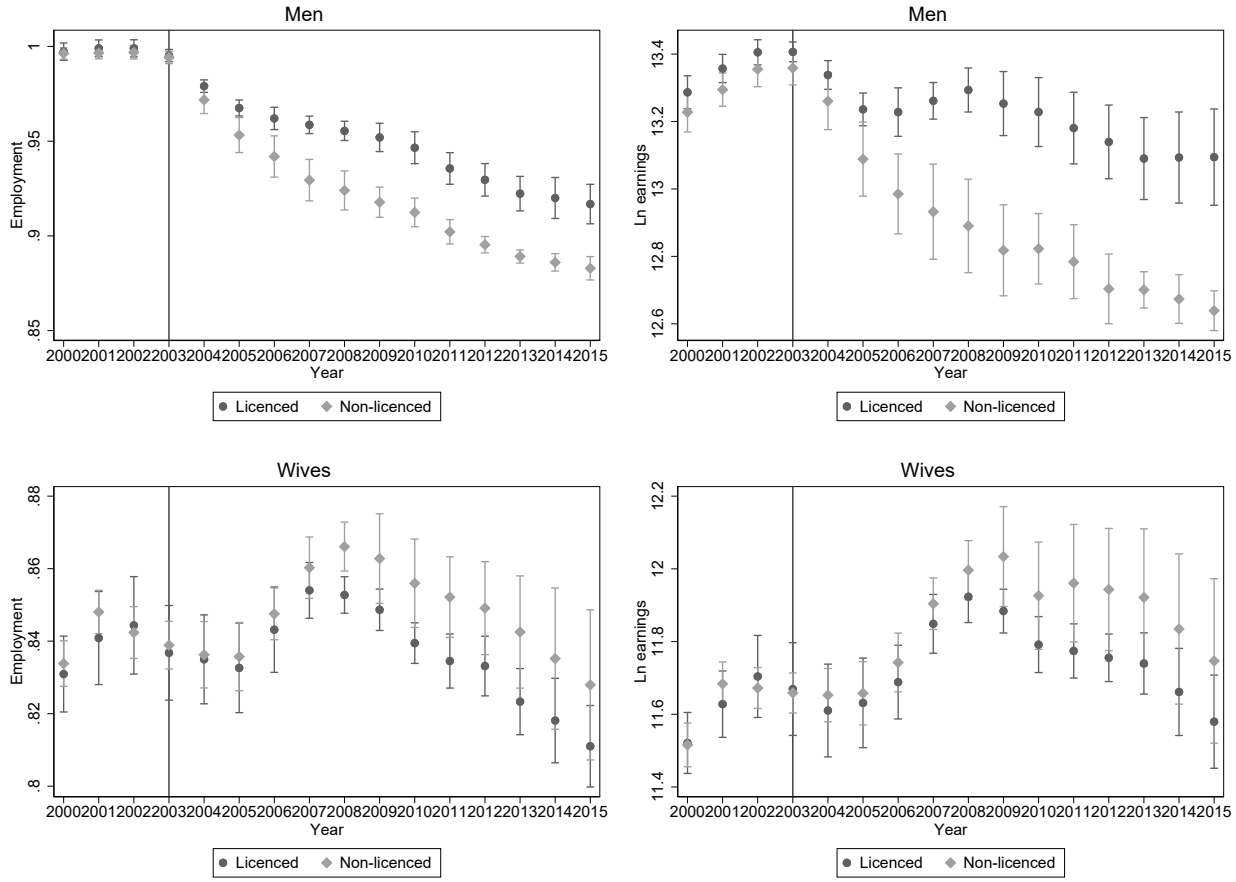
Table A.1 in Appendix presents descriptive statistics for Non-licensed and Licensed workers and their wives, measured in the pre-period year 2003. The mean values show that the two groups are well balanced along observed characteristics in the pre-period. The only notable differences are related to small differences in mean age for both husband and wife, and length of seniority for the husband. In the regressions we adjust for initial differences between the treatment and control groups by including controls for husband's and wife's age in 2003 (dummy-variables), and the husband's seniority (measured in years) at the plant he was employed in 2003.[6] Regarding the pre-period labour supply of the wives', the vast majority are employed (84 and 83 per cent among non-licensed and licensed respectively). But, among those that are employed, almost 40 percent work part-time, potentially leaving scope for extra labour supply on the intensive margin.

4 Results

We first present the results on both partners labor supply at the extensive and the intensive margin. We also estimate the effect of the EU-enlargement on the receipt of public transfers. These estimates provide evidence on the relative role of social insurance versus wife's labor supply as insurance in this type of long-term deterioration of the husband's earnings potential. Second, we present the results for differences in labor supply responses after childbirth and the sharing of parental leave, which provides indications of the substitutability of home production. Third, we present heterogeneity analyses according to the labor supply of the mother and the

[6]Post-2003 estimates are similar without these controls, but pre-trends are significantly different.

Figure 2: Employment and earnings development of licenced and non-licenced workers (upper panel) and their respective wives (lower panel).



Notes: Covariates included are the same as in the regressions; age of both husband and wife in 2003 in addition to the husband's seniority

mother-in-law. These analyses may indicate wether there are any constraints on the role of wives' labor supply as insurance connected to norms and/or preferences about gender roles.

4.1 Household employment and earnings

Figure 2 shows the mean developments in employment and log earnings for licensed and non-licensed workers and their wife, after controlling for the same covariates that we use in the regressions. We see that treatment and control groups are on parallel paths before 2003, and that their paths diverge after the EU-enlargement.

Table 1 shows the differences-in-difference results from estimations of Equation 1 on labor market outcomes of husband and wife. Results are also displayed graphically in Figure 2. The

first two columns show that non-licensed workers lag behind licensed workers in the years following the EU-expansion. Their employment rates fall gradually by 0.6 percentage points in 2004 to 3.3 percentage points in 2009. After that, the lower employment probabilities stabilize at 3.3 percentage points lower. Labour earnings are also long term negatively affected. The long-term effect on labor earnings stabilize at above 25,000 NOK (around 7.5 percent of his 2003 earnings) a year. Negative effects for affected males in the BAC-industry are in line with previous analyses, see e.g., Bratsberg and Raaum (2012); Finseraas et al. (2019). The third column shows the effects on the recipience of public transfers of the husband and find no significant effect on this. This implies that the earnings shocks following increased labor market competition is not insured through the social security system. In the appendix Table A.2, we have estimated the separate effects on sickness absence and disability insurance and find no significant effects on these either. We do not find, therefore, that the decline in earnings induces a transition from employment and on to health related welfare benefits, which is often a concern in the public debate.

The next columns show that increased wives' labour earnings to a large extent compensate for the husbands' earnings loss. Mirroring the husband's gradual earnings-decline, the wives gradually increase their earnings after 2004 before they stabilize at above 12 000 NOK (around 6,5 percent of her 2003 earnings) a year. Her increased earnings compensate around 40 percent of his earnings loss. The wife's increased earnings are as persistent in the long term as the husband's decreased earnings, which indicates that the household division of labor is permanently altered as a consequence of the change in relative wages and job opportunities following the EU-enlargement. Increased labor supply of the wife is mirrored in a lower probability of receiving public transfers. Table A.2 shows that some of this decline is due to lower sickness absence rates among affected wives. The extra labor supply of the wife has therefore no "cost" in terms of higher sickness absence, and the self-insurance through wives' labor supply seem to actually crowd out insurance through public transfers directed at her.

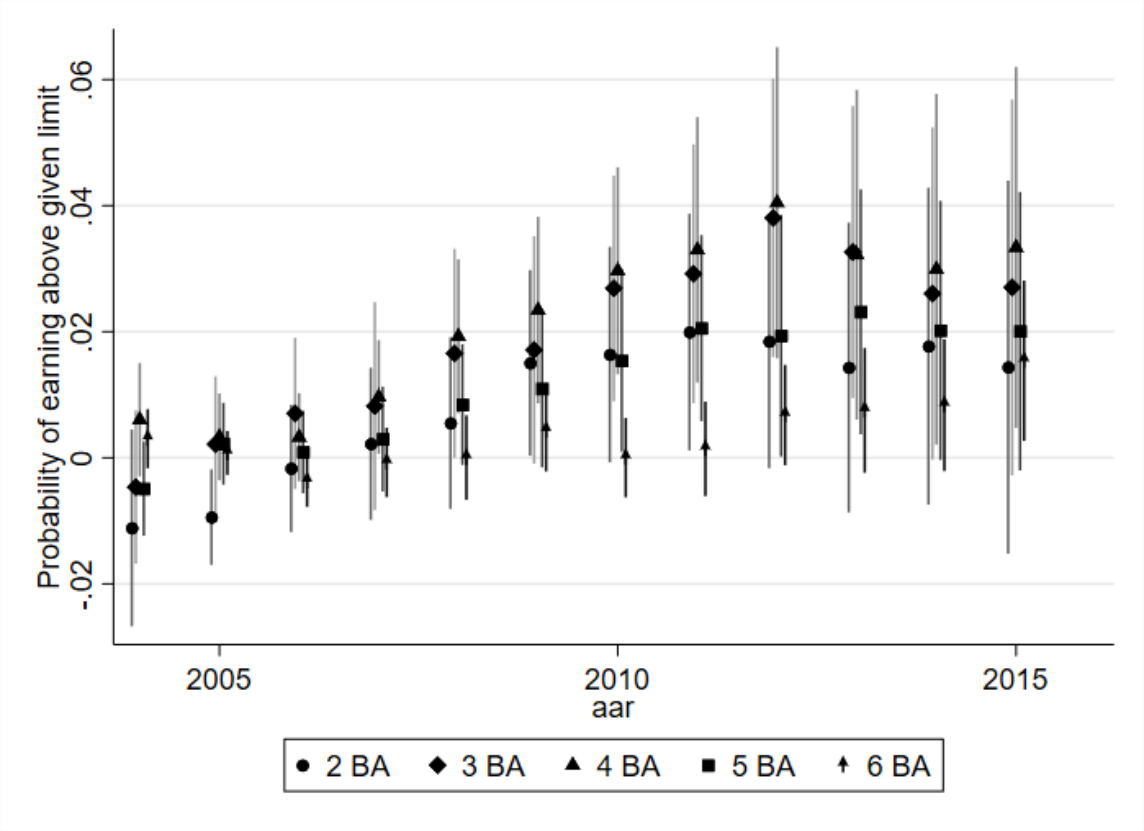
As presented in the introductory section, there was a much smaller increase in the share of immigrants in the female dominated industries like Health compared to the development in the

Table 1: The impact of the 2004 EU enlargement on employment and labor earnings. Husband and wife.

	Husband			Wife		
	Labor earnings	Employment	Social security	Labor earnings	Employment	Social security
DD 2000	-2937.7	0.000039	38.0	-809.0	0.00078	59.1
	(5426.2)	(0.0013)	(535.5)	(2588.5)	(0.0041)	(658.9)
DD 2001	-688.5	-0.0015	603.0	-1459.5	0.0051	54.7
	(4543.5)	(0.0012)	(467.4)	(1453.2)	(0.0037)	(553.7)
DD 2002	2394.1	-0.0012	343.1	-876.5	-0.0041	641.7*
	(2250.0)	(0.0011)	(362.6)	(917.2)	(0.0031)	(333.4)
DD 2004	-2287.0	-0.0063**	229.8	789.0	-0.00083	890.8
	(3175.6)	(0.0030)	(404.8)	(900.9)	(0.0035)	(646.8)
DD 2005	-3687.3	-0.013***	-28.1	1294.9	0.0010	832.2
	(4167.0)	(0.0034)	(715.6)	(1432.1)	(0.0039)	(812.3)
DD 2006	-6616.7**	-0.019***	156.0	1380.4	0.0022	550.0
	(2927.5)	(0.0044)	(1046.5)	(1828.6)	(0.0056)	(793.4)
DD 2007	-12880.5***	-0.028***	254.7	2428.6	0.0042	-328.1
	(3860.1)	(0.0043)	(1063.8)	(2386.3)	(0.0058)	(901.1)
DD 2008	-22774.4***	-0.030***	607.4	6069.4**	0.011*	-847.5
	(4590.7)	(0.0048)	(1197.7)	(2740.9)	(0.0067)	(1135.4)
DD 2009	-27090.5***	-0.033***	2471.6*	7746.9**	0.012	-392.3
	(6723.0)	(0.0051)	(1375.4)	(3424.0)	(0.0075)	(1141.4)
DD 2010	-26849.9***	-0.033***	1682.2	10030.0**	0.014*	-1818.1
	(6753.5)	(0.0053)	(1553.8)	(4060.4)	(0.0082)	(1447.7)
DD 2011	-25286.5***	-0.032***	1302.4	11686.1**	0.016*	-2804.6*
	(8200.1)	(0.0055)	(2827.9)	(4813.7)	(0.0083)	(1424.6)
DD 2012	-27449.9***	-0.033***	-356.9	13668.6**	0.014	-3595.1**
	(9173.9)	(0.0057)	(4024.8)	(5723.1)	(0.0094)	(1678.8)
DD 2013	-27596.2**	-0.032***	-493.3	13621.4**	0.017	-4036.5*
	(10677.4)	(0.0064)	(5539.9)	(6591.3)	(0.011)	(2115.5)
DD 2014	-30331.0**	-0.033***	2703.7	12684.3*	0.015	-2975.2
	(12343.6)	(0.0074)	(5834.8)	(7413.0)	(0.013)	(2502.6)
DD 2015	-29023.6**	-0.033***	-975.1	12845.9	0.015	-3274.5
	(12056.9)	(0.0077)	(6460.4)	(8234.7)	(0.014)	(2974.5)
N	308627	308627	308627	308627	308627	308627

Notes: Level of significance: *** 1%, ** 5%, * 10%. Standard errors are clustered at the 2003 occupation level.

Figure 3: The impact of immigration on wife's earnings - different earnings cutoffs



BAC-industry. Furthermore, a large share (almost 40 percent) work part-time before the EU-enlargement. There was therefore seemingly a large room for these women to compensate the household's earnings losses by increasing their own labor supply. And, the results for earnings suggest that they did.[7]

Her employment on the extensive margin increases by around 1.5 percentage points (less precisely estimated in the later years). The extensive margin is therefore not the most important margin. To investigate which margin is the most important, we therefore estimate the effects on different earnings cutoffs as described in Section 3 and report the results in Figure 3. We see that the largest effects are for middle earnings, 300 and 400 thousand NOK.[8] There is a 4 percentage point higher probability of earning above these earnings cutoffs at the most. For

[7]A very small share (4.6 percent) of the women in the sample also work in the construction sector which was most affected by the inflow of labor immigrants. We have run the regressions without these households and the effects are almost identical, just more significant.

[8]Mean wages for fulltime working women in the sample is around 400 thousand in 2015 prices, while it is around 250 thousand for part-time working women. Mean wages for the total sample of women is around 300 thousand.

earnings cutoffs further away from the mean like 200 and 500 thousand NOK, the effect is almost half. For higher earnings (above 600 thousand), the effect is zero and insignificant. This means that increases in labor supply mostly happen around the mean earnings cutoffs which indicates that it is not the marginal women with very high or very low earnings that increase their labor supply; it is rather "the average" women that increase her working hours. We have also estimated the effect on the probability of having a different employer than she had in 2003.[9] We find no significant effect on this measure, indicating that when these women increases their labor supply, it is possible to do so in their present job.

Compared to the AWE-literature following wives' labor market responses after plant closures and mass layoffs at the husband's workplace, these effects are large. This is consistent with the theory that households should respond more strongly to shocks that are more long-term and thereby affect life-time earnings more severely.

4.2 Home production

Does the change in wives' relative improvement in labour market position also affect the level and the sharing of home production? One of the largest shifts in the level of home-production is when the family has (more) children, and there is extensive evidence in the literature that the birth of children affects female labor supply negatively while it has minimal impact on men's labor supply (for evidence on Norway, see e.g. Cools et al. (2017))). In this section, we measure the effect of the EU-enlargement on marital stability, the level of home production (measured by number of children), and the sharing of parental leave. We also investigate whether wives of licensed and non-licensed workers respond differently to the event of having children using an event-study approach similar to Kleven et al. (2019).

For parental leave, in Norway, there is a "daddy quota" reserved for the father, but a very small share of fathers stay at home with their child for more than the reserved quota. Because not every family has a child (or more) during the period and parental leave benefits are also contingent on employment, the sample for parental leave take-up is a selected sample. The

[9] Results available upon request.

Table 2: The impact of immigration on the take-up of parental leave. Husband and wife.

	Still married	Number of children	Births	His share, parental leave
DD 2000	-0.0040	-0.019	0.0018	
	(0.013)	(0.034)	(0.0035)	
DD 2001	-0.0079	-0.019	-0.0054	-0.011
	(0.013)	(0.025)	(0.0051)	(0.0084)
DD 2002	-0.0055	-0.012	-0.0019	-0.016*
	(0.012)	(0.013)	(0.0037)	(0.0095)
DD 2004	0.0052**	0.0061	-0.0084	-0.0035
	(0.0022)	(0.011)	(0.0061)	(0.012)
DD 2005	0.0042	0.019	-0.0025	-0.024**
	(0.0036)	(0.018)	(0.0063)	(0.010)
DD 2006	0.0073*	0.031	-0.0038	-0.028**
	(0.0038)	(0.024)	(0.0083)	(0.011)
DD 2007	0.0020	0.036	-0.010	-0.0024
	(0.0041)	(0.030)	(0.0076)	(0.018)
DD 2008	0.0046	0.036	-0.013	-0.036**
	(0.0051)	(0.034)	(0.0088)	(0.016)
DD 2009	0.00037	0.042	-0.0081	-0.017
	(0.0061)	(0.037)	(0.0098)	(0.015)
DD 2010	-0.00049	0.042	-0.014	-0.079***
	(0.0069)	(0.039)	(0.012)	(0.020)
DD 2011	0.00014	0.043	-0.013	-0.022
	(0.0068)	(0.041)	(0.011)	(0.028)
DD 2012	0.00083	0.048	-0.010	0.048
	(0.0083)	(0.042)	(0.012)	(0.035)
DD 2013	-0.0021	0.046	-0.013	-0.0077
	(0.0081)	(0.042)	(0.012)	(0.052)
DD 2014	-0.00056	0.046	-0.014	0.058
	(0.0080)	(0.042)	(0.012)	(0.049)
DD 2015	-0.0039	0.043	-0.013	
	(0.0083)	(0.042)	(0.012)	
N	308627	308627	308627	6854

Notes: Level of significance: *** 1%, ** 5%, * 10%.

results should therefore be interpreted with caution for this variable. It does, however indicate to what extent spouses' hours in home production are substitutable in families that get children during the period.

First, we investigate whether affected households stay together and whether there is an effect on number of children born to the household. We find positive effects on marital stability right after the enlargement, but after that, there is no consistent effect on this measure. We do not find any effects on number of children (which is a cumulative measure) or the probability of having a child (which is a yearly measure). The EU enlargement does therefore not significantly affect the level of these measures of home production. It also indicates that selection into parenthood does not change in a different way in the treatment and control groups after 2004.

Next, we investigate the effect on the sharing of home production as measured by the sharing of parental leave period. We make sure to compare households that have children in the same year (and apply to the same rules about length of the total period and the daddy quota). We also condition on both partners being employed in the year before so that they are eligible for parental leave. Within this sample of parents, his share of the parental leave period is slightly lower for non-licensed husbands compared to licensed husbands. They are, however also on a slightly lower level in 2002 and the EU-enlargement does not seem to involve a clear change in the division of home production in these households. Parental leave is only one single measure of home-production, however, and if mechanisms work differently for other types of household chores, our measure does not pick this up.

Halla et al. (2018) find that the wife response to husband's unemployment is smallest in the group that has small children, indicating that there is little room for intra-family substitution of home hours when the children are small. We investigate whether wives labor supply changes equally much for licensed and non-licensed wives according to whether they had children in 2003 or not, and according to the age of the youngest child. The results are presented in Table A.3 in the Appendix.

The main picture in this table, is that there is no significant difference in response according to having a child or not, or according to the age of the child. This suggests that having a (small) child is not an important constraint on women's labor supply responses in Norway. This in turn, may be due to the high availability of high quality, subsidised child-care services. In Norway, the kindergarten coverage is high, also for the smallest children from 1-3 years old. Schools have after-school programs for children up to 10 years old. If there are constraints to the substitutability of spouse hours in home-production, the household may therefore easily take advantage of the child-care services available. Other housekeeping services are relatively higher priced, because they are not publicly subsidised. With our data, we cannot know whether the household makes changes to the division of home-hours that are not observed in the data, or whether their children e.g. stay longer hours in kindergarten and after school programs.

Table 3: The impact of the 2004 EU enlargement on the wives' ln earnings. Sample split by educational level, previous fulltime employment and previous generation's labor supply.

	Her mother's labor supply		His mother's labor supply	
	No work	Work	No work	Work
DD 2004	-0.050	0.086**	-0.012	0.073*
	(0.045)	(0.042)	(0.041)	(0.039)
DD 2005	-0.041	0.057	-0.050	0.062
	(0.055)	(0.056)	(0.067)	(0.055)
DD 2006	-0.022	0.083	-0.13	0.12*
	(0.065)	(0.073)	(0.10)	(0.070)
DD 2007	0.028	0.060	-0.16	0.13**
	(0.087)	(0.072)	(0.11)	(0.065)
DD 2008	0.0098	0.087	-0.11	0.14**
	(0.11)	(0.072)	(0.13)	(0.067)
DD 2009	0.086	0.16*	0.011	0.19**
	(0.12)	(0.085)	(0.14)	(0.079)
DD 2010	0.058	0.15	-0.047	0.19**
	(0.14)	(0.095)	(0.15)	(0.087)
DD 2011	0.079	0.20**	0.085	0.21**
	(0.18)	(0.086)	(0.16)	(0.089)
DD 2012	0.086	0.20**	0.043	0.22**
	(0.20)	(0.097)	(0.19)	(0.092)
DD 2013	0.071	0.19*	0.079	0.20**
	(0.24)	(0.099)	(0.23)	(0.092)
DD 2014	0.017	0.19*	0.079	0.18*
	(0.26)	(0.11)	(0.23)	(0.11)
DD 2015	0.016	0.18	0.12	0.16
	(0.29)	(0.11)	(0.27)	(0.12)
N	79954	228673	80741	227886

Notes: Level of significance: *** 1%, ** 5%, * 10%.

4.3 Mother and mother-in-law's labor supply

Norms about female labor supply may serve as limits to the wife's response, as suggested in e.g. Halla et al. (2018). If this is important we would expect to see a smaller response among more "traditional" women. In the research literature, mothers labour supply has been used as an indicator of norms and preferences formed during childhood (Fernández and Fogli (2009)), and both the wife and the husband's norms and preferences may play a role Fernández et al. (2004). We split the sample according to whether the mothers worked when the wife or the husband was young (7-16 years of age). We define the mothers as not working if their mean earnings were in the lowest 25 percentile of the earnings distribution during that age span.[10]

The results for mothers labour supply are reported in Table 3. Since we compare the size

[10]Only using those with zero earnings results in a too small group of non-working mothers and mothers-in-law, therefore we also include some low labor market attachment parents.

of the effects across different samples with different earnings levels, we choose to specify the dependent variable in log of earnings instead of levels, as in the previous tables.[11] The coefficients may therefore approximately be interpreted as changes in per cent (multiplied by 100).

The labor market responses of wives are clearly larger - and also only significantly different form zero - for women who had a mother who worked and/or a mother-in-law who worked. These responses are consistent with the findings in (Fernández et al., 2004; Fernández and Fogli, 2009) on the labor market supply behavior of the generation after 2nd World War working women and second-generation American women respectively. As Norway has had high female labor supply for a long period, the majority of husbands and wives in our sample had a working mother when they grew up. Our results imply, therefore, that one of the reasons why we see such a large response on average, is that most of the wives had a working mother and mother-in-law. They also indicate that norms/preferences against female labor supply is not an important constraint against women's labor supply in Norway.

5 Conclusion

The EU-enlargement in 2004 to Eastern European countries, led to a sharp increase in labor immigrants coming to countries such as Norway. The Building- and Construction (BaC) industry was especially affected, and the immigrant share rose from 4 percent to 20 percent during the period 2004-2015. This affected native worker's earnings negatively - a development which is not insured through the public social security system. This paper investigates the role of wife's labor supply as insurance against this type of long-term shock to male earnings in the BaC-industry. We identify the effects by comparing households where the husband has a vocational education that allows him to work in a licensed occupation (e.g., electrician, or plumber) to households where the husband has a vocational education that does not allow him to work in a licensed occupation (e.g., carpenter, or painter). We show that these households were very

[11] In Table 1, we use earnings levels to be able to compare the effect of husband and wife and see how much of the earnings loss is compensated by the wife.

similar before the EU-enlargement in 2004, but that their earnings paths diverge after 2004.

The results show that non-licensed husbands who worked in the BaC-industry in 2003, experience a negative wage development in the post-period, compared to licensed husbands who worked in the BaC-industry. The negative development is observed both in the short-term and the long-term. The long-term effect on annual wages stabilize at above 25,000 NOK (around 7.5 percent of the 2003 earnings) a year. The wives of the non-licensed women compensate for a sizeable part of the wage loss by increasing their own labour supply. Results show that increased labor supply of the wife compensate almost 40 percent of the loss in male earnings. The largest effects are for earnings in the middle of the wives' earnings distribution, meaning that we find the largest responses among the "average wife". We do not find, however, that the relative change in market hours are met by opposite changes in home production hours, measured by the sharing of parental leave.

The wives' labor supply response to declining earnings of the husband in our study is large compared to previous literature studying wives' responses to husband unemployment (using plant closings and mass layoffs as exogenous variation in husband unemployment). The large average effects are consistent with the permanency of the shock, and the low compensation by social insurance against long-term wage declines. The large average effects are also consistent with few external constraints on the labor supply of women in Norway, e.g. by norms against female labor supply or the availability of high quality, low cost child-care services. We find for example no heterogeneity of results according to whether the family has (young) children.

We find indications, however, that norms/preferences may still be a constraint for some. If we look at women coming from more traditional families where the mother did not work, we do not see the same labor market response to the EU-enlargement. These are however few in numbers, and consequently do not dominate the average effects.

A Appendix

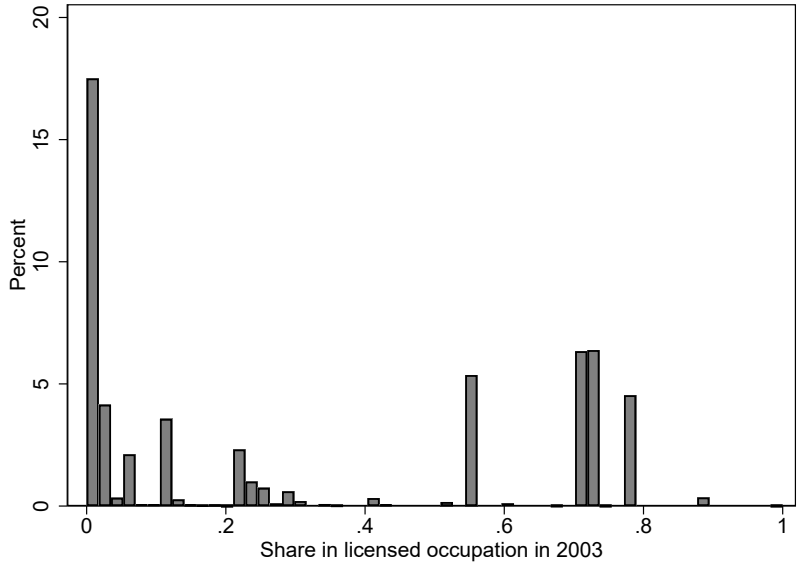
A.1 The license definition

The definition of treatment and control groups is based on three sources of data that are linked together. 1) The Norwegian educational register which records the highest completed level of education of all individuals in Norway yearly. The education code is a six digit code from the Norwegian Standard of Educational Classification (NUS). 2) The Employer-Employee register which include the occupations of all workers with a seven-digit code of the Norwegian standard of occupational classification (STYRK). Occupational codes are available from 2003. 3) The Norwegian Occupational Regulations Database (NORD) which registers the prevalence of occupational licensure and certifications (Alecu and Drange, 2016; Bol and Drange, 2017). In this database, "An occupation is classified as licensed if the right to practise is regulated by the authorities by law or by regulations of the law." The regulations determine the educational demands, which must be fulfilled to practice within an occupation.

Our starting sample when constructing the license variable consists of all employees with a completed vocational education (skilled workers) that worked in the Norwegian building and construction sector in 2003. We want to capture which workers are at risk of being exposed to labor market competition from labor immigrants, and use their type of education as the fundamental source of risk of exposure. Type of education is determined long before the EU enlargement, and also determines which occupations a worker can enter - and thereby determines the possibility a worker has of entering a licensed occupation. We use the full six digits in the NUS code to classify education categories into 406 educational groups.

Next, we exploit that each employed individual in our database is characterized by the STYRK code of his or her occupation. For each educational group, we calculate the share of workers who is employed in a licensed occupation. The correspondence between education group and the probability of working in a licensed occupation is not one-to-one. An electrician for example does not have to work in a licensed occupation, although a high share does. Figure 4 shows the distribution of the share that is licensed in each education group.

Figure 4: Share of BaC education groups in a licensed occupation in 2003



Notes: The biggest educational groups with a share in licensed occupations below 10%, are educations as carpenter (NUS: 457129) and formwork (NUS: 457108). The biggest educational groups with a share in licensed occupations above 10%, are educations as electrician (NUS: 455103), eneryoperator (NUS: 455107) and plumber (NUS: 457121).

We classify individual workers as protected or not protected by licensing according to whether more than 10% of workers with the same education worked in a licensed occupation. We have tried different cutoffs between 10% and 50% and the results are largely the same, but differ in precision. Thus, the treatment group is defined as skilled workers in the construction industry in 2003 who-according to their vocational education- are not protected by licensing in their labour market. Correspondingly, the control group is defined as all skilled workers in the construction industry in 2003 who are protected by licensing in their labour market.

A.2 Appendix tables

Table A.1: Descriptive statistics

	Non-licenced		Licenced	
	mean	sd	mean	sd
Individual characteristics				
Age	38.3	(7.50)	39.6	(7.75)
Labor earnings	330599.2	(91451.1)	345866.0	(93658.5)
Fulltime	0.99	(0.092)	0.99	(0.095)
Seniority	5.95	(5.39)	5.91	(5.94)
Number of children	1.99	(1.08)	1.99	(1.05)
Partner characteristics				
Age	36.3	(7.52)	37.5	(7.83)
Labor earnings	185316.4	(109215.5)	188502.9	(112433.3)
Employment	0.84	(0.37)	0.83	(0.37)
Fulltime	0.61	(0.49)	0.62	(0.49)
Public sector	0.55	(0.50)	0.54	(0.50)
Lower secondary schooling	0.41	(0.49)	0.43	(0.50)
Upper secondary schooling	0.37	(0.48)	0.36	(0.48)
University	0.21	(0.41)	0.21	(0.40)
Her mother worked when she was 7-16 years	0.76	(0.42)	0.73	(0.45)
Family background				
Mean income, father	87254.7	(69970.0)	81125.4	(71410.4)
Mean income, mother	31010.5	(39083.0)	27858.3	(38340.7)
Master level, one or both parents	0.0089	(0.094)	0.0081	(0.090)
Bachelor level, one or both parents	0.059	(0.24)	0.071	(0.26)
Upper secondary, one or both parents	0.57	(0.50)	0.58	(0.49)
Lower secondary, one or both parents	0.37	(0.48)	0.34	(0.47)
His mother worked when he was 7-16 years	0.76	(0.43)	0.72	(0.45)
N	9940		13530	

Notes: Level of significance: *** 1%, ** 5%, * 10%.

Table A.2: The impact of immigration on sickness absence and disability. Husband and wife

	Husband		Wife	
	Sickn abs	Disability	Sickn abs	Disability
DD 2000	-0.51	-0.0013**	-0.34	0.00094
	(0.63)	(0.00068)	(0.56)	(0.0018)
DD 2001	-0.84	-0.0015***	-1.21*	-0.00018
	(0.56)	(0.00053)	(0.64)	(0.0013)
DD 2002	-0.44	-0.00060	-1.10	-0.00062
	(0.91)	(0.00041)	(0.87)	(0.00080)
DD 2004	-0.78	0.00034	-1.60*	-0.0013
	(0.63)	(0.00062)	(0.89)	(0.00091)
DD 2005	-0.20	-0.000029	-0.57	-0.00020
	(0.72)	(0.0011)	(0.66)	(0.0013)
DD 2006	-0.16	-0.00094	-1.68*	-0.00041
	(0.71)	(0.0016)	(0.88)	(0.0010)
DD 2007	-0.79	-0.0025	-1.78*	-0.00061
	(0.67)	(0.0023)	(1.02)	(0.0013)
DD 2008	0.25	-0.0020	-1.64*	-0.00015
	(1.14)	(0.0028)	(0.91)	(0.0026)
DD 2009	0.85	0.00019	-0.94	-0.0017
	(0.90)	(0.0043)	(0.81)	(0.0032)
DD 2010	-0.31	-0.00016	-0.70	-0.0026
	(0.70)	(0.0051)	(0.72)	(0.0046)
DD 2011	-1.07	-0.00069	-2.03***	-0.0042
	(1.05)	(0.0066)	(0.74)	(0.0050)
DD 2012	-0.18	-0.0025	-0.34	-0.0069
	(0.70)	(0.0069)	(0.82)	(0.0052)
DD 2013	-0.077	-0.0023	-0.70	-0.0091
	(0.75)	(0.0075)	(1.11)	(0.0056)
DD 2014	1.21	0.0012	-0.84	-0.0097
	(0.94)	(0.0071)	(1.03)	(0.0067)
DD 2015	-1.48**	0.0028	-1.15	-0.0085
	(0.61)	(0.0073)	(0.77)	(0.0086)
N	308627	308627	308627	308627

Notes: Level of significance: *** 1%, ** 5%, * 10%.

Table A.3: Heterogeneity according to presence of children and youngest child age

	No child 2003	Have child 2003	0-6	7-12	13-18	19-
DD 2004	-0.011	0.059	0.050	0.15**	0.10	-0.098
	(0.071)	(0.040)	(0.067)	(0.072)	(0.096)	(0.11)
DD 2005	-0.050	0.045	0.057	0.051	0.012	-0.010
	(0.087)	(0.051)	(0.064)	(0.10)	(0.11)	(0.12)
DD 2006	0.032	0.067	0.0055	0.14	0.16	-0.017
	(0.14)	(0.065)	(0.091)	(0.12)	(0.10)	(0.14)
DD 2007	0.18	0.054	0.017	0.052	0.11	0.052
	(0.14)	(0.066)	(0.086)	(0.17)	(0.11)	(0.13)
DD 2008	0.014	0.090	0.0030	0.081	0.17	0.086
	(0.13)	(0.071)	(0.080)	(0.16)	(0.13)	(0.14)
DD 2009	0.19	0.16*	0.071	0.16	0.19	0.20
	(0.16)	(0.090)	(0.12)	(0.17)	(0.13)	(0.12)
DD 2010	0.23	0.14	0.16	0.045	0.23	0.15
	(0.19)	(0.096)	(0.14)	(0.18)	(0.14)	(0.13)
DD 2011	0.32	0.18*	0.056	0.20	0.24*	0.21
	(0.20)	(0.11)	(0.15)	(0.17)	(0.13)	(0.15)
DD 2012	0.29	0.19	0.11	0.14	0.28**	0.21
	(0.21)	(0.12)	(0.18)	(0.15)	(0.14)	(0.16)
DD 2013	0.34	0.18	0.0046	0.22	0.25	0.19
	(0.21)	(0.13)	(0.20)	(0.15)	(0.18)	(0.18)
DD 2014	0.30	0.17	0.25	0.10	0.21	0.20
	(0.25)	(0.14)	(0.27)	(0.18)	(0.19)	(0.18)
DD 2015	0.34	0.16	0.084	0.063	0.29*	0.16
	(0.28)	(0.15)	(0.24)	(0.17)	(0.17)	(0.18)
N	27566	281061	91571	71407	56381	68762

Notes: Level of significance: *** 1%, ** 5%, * 10%.

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